# The American Midland Naturalist

Founded by J. A. Nieuwland, C.S.C.

**Editor**
**Robert P. McIntosh**

ASSOCIATE EDITORS

Kraig Adler, Ithaca, New York.....Herpetology
Norman L. Christensen, Durham, North Carolina.....Plant Ecology
Gary L. Cunningham, Las Cruces, New Mexico.....Plant Physiology
Martin Daly, Hamilton, Ont., Canada.....Animal Behavior
Melinda F. Denton, Seattle, Washington.....Systematic Botany
Gerald W. Esch, Winston-Salem, North Carolina.....Parasitology
Frances C. James, Tallahassee, Florida.....Animal Ecology
Nancy Lorimer, St. Paul, Minnesota.....Genetics and Cytology
Rosemary J. Mackay, Toronto, Ont., Canada.....Limnology and Hydrobiology
Bertram G. Murray, Jr., New Brunswick, New Jersey.....Ornithology
R. L. Pardy, Lincoln, Nebraska.....Invertebrate Zoology
J. Mark Scriber, Madison, Wisconsin.....Entomology
Gerald E. Svendsen, Athens, Ohio.....Mammalogy
James D. Williams, Washington, D.C.....Ichthyology

**Vol. 105, 1981**
**(January, April)**

**Dates of Publication**
**No. 1 February 4, 1981**
**No. 2 April 30, 1981**

PUBLISHED BY THE UNIVERSITY OF NOTRE DAME
NOTRE DAME, INDIANA

## CONTENTS

### No. 1, January, 1981


Vegetation of Northern New Jersey Before European Settlement.....Emily W. B. Russell 1

Effect of Season of Burning and Mowing on an Eastern Nebraska Stipa-Andropogon Prairie.....Edward I. Hover and Thomas B. Bragg 13

Factors Affecting the Establishment of Natural Vegetation on a Coal Strip Mine Spoil Bank in Southeastern Ohio.....Timothy J. Bell and Irwin A. Ungar 19

The Distribution of Plant Water Stress and Vegetation Characteristics in Southern California Chaparral.....D. K. Poole and P. C. Miller 32

Spring Ground Layer Vegetation 50 Years After Harvesting in Northern Hardwood Forests.....Fred Metzger and Jan Schultz 44

Seed Production and Seedling Establishment in the May Apple, Podophyllum peltatum L.....R. W. Rust and R. R. Roth 51

Tree Invasion of Montane Meadows in Oregon.....Thomas R. Vale 61

Seasonal Diets of the Porcupine Caribou Herd.....D. C. Thompson and K. H. McCourt 70

Genic Variation in Ord's Kangaroo Rat Dipodomys ordii in Oklahoma.....Melvin L. Beck, Michael L. Kennedy and Charles J. Biggers 77

Systematics of the Santa Catalina Whiptail (Cnemidophorus catalinensis) with Reference to the Superspecies Cnemidophorus tigris.....J. Martin Walker and T. Paul Maslin 84

Long-term Analysis of Reproductive Periodicity in the Lizard Cnemidophorus uniparens.....Orlando Cuellar 93

Food Partitioning in Three Sympatric Species of Map Turtle, Genus Graptemys (Testudinata, Emydidae).....Richard C. Vogt 102

Ectoparasites of Muskrats from Indiana with Special Emphasis on Spatial Distribution of Coexisting Mites of the Genus Listrophorus.....Cheryl A. Bauer and John O. Whitaker, Jr. 112

Arthropod Use of Invertebrate Carrion.....T. R. Seastedt, Louis Mameli and Krista Gridley 124

Nesting Biology of the Bumblebee Wolf Philanthus bicinctus Mickel (Hymenoptera: Sphecidae).....Darryl T. Gwynne 130

Locomotor Responses of the Striped Bass, Morone saxatilis, to Environmental Variables.....Loren G. Hill, Gary D. Schnell and William J. Matthews 139

Tolerance of Headwater vs. Mainstream Fishes for Abrupt Physicochemical Changes.....William J. Matthews and John T. Styron, Jr. 149

Foraging Ecology of Seed-harvesting Ants, Pheidole spp. in a Chihuahuan Desert Ecosystem.....Walter G. Whitford, Dirk J. Depree, Patrick Hamilton and George Ettershank 159

Use of Multiple Cues in Short-Range Migrations of Crustacea.....Steve Rebach 168

Crayfish Predation in Corbicula Under Laboratory Conditions.....A. P. Covich, L. L. Dye and J. S. Mattice 181

Notes and Discussion

A Functional Approach to Estimating Habitat Edge Width for Birds.....J. Edward Gates and James A. Mosher 189

Dynamics of a Gray Bat Population (Myotis Grisescens) in Missouri.....William H. Elder and Wilbur J. Gunier 193

Magnesium and Calcium Nutrition of a Serpentine Endemic Grass.....John L. Main 196

Nonrandom Mating Among Geographic Strains of the Housefly from Western United States.....K. T. Kimball and E. H. Bryant 200

Changes in Populations of Reticulate Sculpins (Cottus perplexus) After Clear-cut Logging as Indicated by Downstream Migrants.....John R. Moring 204

A Wood-mouse (Peromyscus leucopus) Nest Site in a Hornet's Nest.....C. William Kilpatrick, James W. Kilpatrick and Scott M. Kilpatrick 208

## CONTENTS

### No. 2, April, 1981


Behavioral Responses of a Predator, the Round-tailed Horned Lizard, Phrynosoma modestum and Its Prey, Honey Pot Ants, Myrmecocystus spp. ..... David T. Shaffer, Jr. and Walter G. Whitford 209

Population Structure and Reproductive Characteristics in Cnemidophorus parvisocius (Lacertilia: Teeidae) ..... J. Martin Walker 217

Low Genetic Variability and High Similarities in the Crayfish Genera Cambarus and Procambarus ..... Karen Brown 225

The Unionid (Mollusca: Bivalvia) Fauna of the Kankakee River in Illinois ..... Liane Suloway 233

Apparent Exclusion of the Cladoceran Bosmina longirostris by the Invertebrate Predator Chaoborus americanus ..... Carl N. von Ende and Diane O. Dempsey 240

Organochlorine Residues in Young Mexican Free-Tailed Bats from Several Roosts ..... Kenneth N. Geluso, J. Scott Altenbach and Don E. Wilson 249

Behavior of the Evening Bat Nycticeius humeralis at a Nursery Roost ..... Larry C. Watkins and Karl A. Shump, Jr. 258

Colony Characteristics and Vertebrate Associates of White-tailed and Black-tailed Prairie Dogs in Wyoming ..... Thomas M. Campbell, III and Tim W. Clark 269

The Ecological Life Cycle of Frasera caroliniensis, a Long-lived Monocarpic Perennial ..... Paul F. Threadgill, Jerry M. Baskin and Carol C. Baskin 277

Presettlemen Forests of the Unglaciated Portion of Southern Illinois ..... Lawrence A. Leitner and Marion T. Jackson 290

Photosynthesis and Growth in Populations of Populus deltoides from Contrasting Habitats ..... A. B. McGee, M. R. Schmierback and F. A. Bazzaz 305

The Effect of Seed Size and Relative Emergence Time on Fitness in a Natural Population of Impatiens capensis Meerb. (Balsaminaceae) ..... Nicholas Howell 312

Forest Structure Dynamics Following Wildfire and Prescribed Burning in the New Jersey Pine Barrens ..... Ralph E. J. Boerner 321

Courtship Solicitation by Colias Females (Lepidoptera: Pieridae) ..... Ronald L. Rutowski, Cruz E. Long, Larry D. Marshall and Richard S. Vetter 334

Trophic Ecology of Three Winter Stoneflies (Plecoptera) ..... Robert A. Short and James V. Ward 341

Temporal Variation in Vagility: Implications for Evolutionary Studies ..... Raymond R. White and Malcolm P. Levin 348

Prey Capture by the Crab Spider Misumena vatia (Clerck) (Thomisidae) on Three Common Native Flowers ..... Douglass H. Morse 358

Energetics of the Prairie Deer Mouse Peromyscus maniculatus bairdii ..... John G. Morris and S. Charles Kendeigh 368


*Notes and Discussion*


Field Measures of Flower Constancy in Bumblebees ..... James D. Thomson 377

Toxic Nectar Deters Nectar Thieves of Catalpa speciosa ..... Andrew G. Stephenson 381

Two New Color Morphs of the Crayfish Orconectes propinquus (Girard) from Lake Simcoe, Ontario ..... Stephen D. Jordan and D. W. Dunham 384

Methane Formation in the Acidic Peats of Okefenokee Swamp, Georgia ..... Gary M. King, T. Berman and W. J. Wiebe 386

Reproduction and Development of the Pygmy Spotted Skunk (Spilogale pygmaea) ..... William R. Teska, Elaine N. Rybak and Rollin H. Baker 390

Reproduction by the Massasauga (Sistrurus catenatus catenatus) ..... Howard K. Reinert 393

Unusual Frond Development in Sensitive Fern Onoclea sensibilis L. ....Joseph M. Beitel, Warren H. Wagner, Jr. and Kerry S. Walter 396
Frequencies of Developmental Morphs of Chaoborus americanus in Four Fishless Bog Lakes....Carl N. von Ende 401
Evidence for Hybridization Between Two Crayfish Species (Decapoda: Cambaridae: Orconectes) with a Comment on the Phenomenon in Cambarid Crayfish....Douglas G. Smith 405
Return of the Gray Wolf to Wisconsin....L. David Mech and R. M. Nowak 408
Dwarf Sumac as Winter Bird Food....Jean W. Graber and Pamela M. Powers 410
Remains of the Wood Turtle Clemmys insculpta (Le Conte) from a Late Pleistocene Deposit in Middle Tennessee....Paul W. Parmalee and Walter E. Klippel 413
Errata .... 416

## Author Index

Altenback, J. Scott .... 249
Anderson, R. C. .... 208

Baker, Rollin H. .... 390
Baskin, Carol C. .... 277
Baskin, Jerry M. .... 277
Bauer, Cheryl A. .... 112
Bazzaz, F. A. .... 305
Beck, Melvin L. .... 77
Beitel, Joseph M. .... 396
Bell, Timothy J. .... 19
Berman, T. .... 386
Biggers, Charles J. .... 77
Boerner, Ralph E. J. .... 321
Bragg, Thomas B. .... 13
Brown, Karen .... 225
Bryant, E. H. .... 200

Campbell, Thomas M. III .... 269
Clark, Tim W. .... 269
Covich, A. P. .... 181
Cuellar, Orlando .... 93

Dempsey, Diane O. .... 240
Depree, Dirk J. .... 159
Dunham, D. W. .... 384
Dye, L. L. .... 181

Elder, William H. .... 193
Ettershank, George .... 159

Gates, J. Edward .... 189
Geluso, Kenneth N. .... 249
Graber, Jean W. .... 410
Gridley, Krista .... 124
Gunier, Wilbur J. .... 193
Gwynne, Darryl T. .... 130

Hamilton, Patrick .... 159
Hill, Loren G. .... 139
Hover, Edward I. .... 13
Howell, Nicholas .... 312

Jackson, Marion T. .... 290
Jordan, Stephen D. .... 384

Kendeigh, S. Charles .... 368
Kennedy, Michael L. .... 77
Kilpatrick, C. William .... 208
Kilpatrick, James W. .... 208
Kilpatrick, Scott M. .... 208
Kimball, K. T. .... 200
King, Gary M. .... 386
Klippel, Walter E. .... 413

Leitner, Lawrence A. .... 290
Levin, Malcolm P. .... 348
Long, Cruz E. .... 334

Main, John L. .... 196
Mameli, Louis .... 124
Marshall, Larry D. .... 334
Maslin, T. Paul .... 84
Matthews, William J. ....139, 149
Mattice, J. S. .... 181
McCourt, K. H. .... 70
McGee, A. B. .... 305
Mech, L. David .... 408
Metzger, Fred .... 44
Miller, P. C. .... 32
Moring, John R. .... 204
Morse, Douglass H. .... 358
Morris, John G. .... 368
Mosher, James A. .... 189

Nowak, R. M. .... 408

Parmalee, Paul W. .... 413
Poole, D. K. .... 32
Powers, Pamela M. .... 410

Rebach, Steve .... 168
Reinert, Howard K. .... 393
Roth, R. R. .... 51
Russell, Emily W. B. .... 1
Rust, R. W. .... 51
Rutowski, Ronald L. .... 334
Rybak, Elaine N. .... 390

Seastedt, T. R. .... 124
Schelfhout, S. .... 208

Schmierbach, M. R. ..... 305
Schnell, Gary D. ..... 139
Schultz, Jan ..... 44
Shaffer, David T., Jr. ..... 209
Short, Robert A. ..... 341
Shump, Karl A., Jr. ..... 258
Smith, Douglas G. ..... 405
Stephenson, Andrew G. ..... 381
Styron, John T., Jr. ..... 149
Suloway, Liane ..... 233

Teska, William R. ..... 390
Thompson, D. C. ..... 70
Thomson, James D. ..... 377
Threadgill, Paul F. ..... 277

Ungar, Irwin A. ..... 19

Vale, Thomas R. ..... 61
Vetter, Richard S. ..... 334
Vogt, Richard C. ..... 102
von Ende, Carl N. ..... 240, 401

Wagner, Warren H., Jr. ..... 396
Walker, J. Martin ..... 84, 217
Walter, Kerry S. ..... 396
Ward, James V. ..... 341
Watkins, Larry C. ..... 258
Whitaker, John O., Jr. ..... 112
White, Raymond R. ..... 348
Whitford, Walter G. ..... 159, 209
Wiebe, W. J. ..... 386
Wilson, Don E. ..... 249

## Subject Index

Alaska, seasonal diet of caribou .. 70
Arizona, courtship in *Colias* ..... 334

Baja California, systematics of *Cnemidophorus* ..... 84
Behavior, bats at nursery roost .... 258
courtship in *Colias* ..... 334
cues in migrations of crustacea 168
locomotor response of striped bass ..... 139
nonrandom mating in housefly.. 200
predator prey ..... 209
variation in vagility ..... 348
Birds, dwarf sumac as food ..... 410
habitat edge ..... 189
*Bosmina longirostris*, exclusion by predator ..... 240

California, water stress in chaparral ..... 32
variation in vagility of *Euphydryas* ..... 348
*Canis lupus*, return to Wisconsin.. 408
*Catalpa speciosa*, toxic nectar deters nectar thieves ..... 381
*Chaoborus americanus*, developmental morphs ..... 401
exclusion of *Bosmina longirostris* ..... 240
Chihuahuan Desert, foraging ecology of ants ..... 159
*Clemmys insculpta*, Pleistocene remains ..... 413
*Cnemidophorus catalinensis* and *C. tigris*, systematics ..... 84
*C. parvisocius*, population and reproduction ..... 217
*C. uniparens*, reproductive periodicity ..... 93
*Colias* spp., courtship ..... 334
Colorado, flower constancy in bumblebees ..... 377
nesting of bumblebee wolf ..... 130
trophic ecology of stoneflies ..... 341
*Corbicula*, crayfish predation on .. 181
*Cottus preplexus*, population changes after clear cutting .. 204
*Cynomys leucurus* and *C. ludovicianus*, colony characteristics ..... 269

Delaware, seeds and seedlings of may apple ..... 51
*Dipodomys ordii*, genic variation.. 77

Ecology, animal, ants deterred by toxic nectar ..... 381
arthropod use of carrion ..... 124
bat population dynamics ..... 193
dwarf sumac as bird food ..... 410
ectoparasites on muskrat ..... 112
energetics of prairie deer mouse 368
flower constancy in bumblebees 377
food partitioning in *Graptemys* 102
foraging of ants ..... 159
habitat edge in birds ..... 189
locomotor response of striped bass ..... 139
migration of crustacea ..... 168
population changes in *Cottus* .. 204
predation on molluscs ..... 181
prey capture by crab spider .... 358
reproductive periodicity in *Cnemidophorus* ..... 93
seasonal diet of caribou ..... 70
variation in vagility ..... 348
Ecology, plant, effect of burning and mowing on prairie ..... 13
effect of seed size and emergence on fitness ..... 312
establishment of vgetation on strip mine ..... 19
forest structure dynamics after fire ..... 321
life cycle of *Frasera carolinensis* 277
methane formation in swamp .. 386
nutrition of a serpentine endemic grass ..... 196

photosynthesis and growth in *Populus* ..... 305
presettlement vegetation of Illinois ..... 290
presettlement vegetation of New Jersey ..... 1
reproduction in may apple ..... 51
spring flora of northern hardwood forest ..... 44
tree invasion of mountain meadow ..... 61
water stress in chaparral ..... 32

Errata ..... 208, 416
*Euphydryas editha*, variation in vagility ..... 348
Evolution, fitness in *Impatiens capensis* ..... 312
variations in vagility ..... 348
Feeding, arthropod use of carrion 124
birds on dwarf sumac ..... 410
ecology of stoneflies ..... 340
foraging ecology of ants ..... 159
seasonal diet of caribou ..... 70
Ferns, frond development in *Onoclea* ..... 396
Fish, locomotor response of striped bass ..... 139
population change in *Cottus perplexus* ..... 204
tolerance to physicochemical changes ..... 149
*Frasera caroliniensis*, ecological life cycle ..... 277

Genetics, fitness in *Impatiens capensis* ..... 312
genic variation in *Dipodomys* .. 77
genetic variability in crayfish .. 225
nonrandom mating in housefly.. 200
variation in vagility and gene flow ..... 348
Georgia, arthropod use of invertebrate carrion ..... 124
methane formation in swamp .. 386

Illinois, dwarf sumac as bird food 410
photosynthesis and growth of *Populus* ..... 305
presettlement forests ..... 290
unionid fauna of Kankakee River ..... 233
*Impatiens capensis*, fitness ..... 312
Indiana, coexisting mites on muskrat ..... 112
Insects, ants deterred by toxic nectar ..... 381
ant foraging ecology ..... 159
ants as prey of lizard ..... 209
arthropod use of invertebrate carrion ..... 124
courtship in *Colias* ..... 334
flower constancy in bumblebees 377
nesting of bumblebee wolf ..... 130
nonrandom mating in housefly.. 200
trophic ecology of stoneflies .... 340
variation in vagility ..... 348
Invertebrates, other than insects, developmental morphs of *Chaoborus* ..... 401
arthropod use of invertebrate carrion ..... 124
color morphs of crayfish ..... 384
crayfish predation on *Corbicula* 181
genetic variation in crayfish .... 225
hybridization in crayfish ..... 405
migrations of crustacea ..... 168
mites on muskrat ..... 111
predation by *Chaoborus* on *Bosmina* ..... 240
prey capture by crab spider .... 358
unionid fauna of Kankakee River ..... 233

Kentucky, life cycle of *Frasera caroliniensis* ..... 277

Lakes, predation by *Chaoborus* on *Bosmina* ..... 240
*Listrophorus* spp., coexisting on muskrat ..... 112

Maine, prey capture by crab spider ..... 358
Mammals, bat population dynamics ..... 193
bat behavior at nursery roost .. 258
colony characteristics of prairie dogs ..... 269
diet of caribou ..... 70
genic variation in *Dipodomys* .. 77
gray wolf in Wisconsin ..... 408
mites on muskrat ..... 112
pesticide residue in bat ..... 249
pygmy spotted skunk reproduction ..... 390
wood-mouse nest in hornet's nest ..... 208
Massachusetts, fitness of *Impatiens capensis* ..... 312
hybridization in crayfish ..... 405
Methane formation, in Okefenokee Swamp ..... 386
Mexico, population and reproductive characteristics of *Cnemidophorus parvisocius* .. 217
reproduction and development of pygmy spotted skunk .... 390
Michigan, developmental morphs of *Chaoborus* ..... 401
habitat edge in birds ..... 189
predation of *Chaoborus* on *Bosmina* ..... 240

spring flora of northern hardwood forest ..... 44
toxic nectar of *Catalpa* deters nectar thieves ..... 381
Migration, cues for crustacea ..... 168
Missouri, bat behavior ..... 258
bat population dynamics ..... 193
*Misumena vatia*, prey capture .... 358
*Morone saxatilis*, locomotor response ..... 139
*Musca domestica*, nonrandom mating ..... 200
*Myrmecocystus* spp., prey of lizard ..... 209

Nebraska, effect of burning and mowing on prairie ..... 13
New Jersey, forest structure in pine barrens ..... 321
presettlement vegetation ..... 1
New Mexico, foraging ecology of ants ..... 159
lizard preys on ants ..... 209
reproductive periodicity in *Cnemidophorus* ..... 93
*Nycticeius humeralis*, behavior at nursery roost ..... 258

Ohio, establishment of vegetation on strip mine spoil ..... 19
Oklahoma, genic variation in *Dipodomys* ..... 77
*Ondatra zibethicus*, ectoparasites of ..... 112
*Onoclea sensibilis*, frond development ..... 396
Ontario, color morphs of *Orconectes* ..... 384
*Orconectes propinquus*, color morphs ..... 384
*O.* spp. hybridization ..... 405
Oregon, population changes in *Cottus perplexus* ..... 204
tree invasion of mountain meadows ..... 61

*Pagurus longicarpus*, cues in migration ..... 168
Parasites, mites on muskrat ..... 112
Pennsylvania, reproduction by massasauga ..... 393
*Peromyscus leucopus*, nest site in hornet's nest ..... 208
*P. maniculatus bairdii*, energetics 368
Pesticides, residues in bats ..... 249
*Pheidole* spp., foraging ..... 159
*Philanthus bicinctus*, nesting biology ..... 130
Physiology, animal energetics of prairie deer mouse ..... 368
locomotor responses of striped bass ..... 139
tolerance of fish to physiochemical change ..... 149
Physiology, plant, nutrition of serpentine endemic ..... 196
photosynthesis and growth of *Populus* ..... 305
water stress in chaparral ..... 32
*Phrynosoma, modestum*, predatory behavior ..... 209
Pleistocene, remains of *Clemmys*.. 413
*Poa curtifolia*, nutrition ..... 196
*Podophyllum peltatum*, seed production and seedling establishment ..... 51
*Populus*, photosynthesis and growth ..... 305
Predation, *Chaoborus* on *Bosmina* 240
crab spider ..... 358
crayfish on *Corbicula* ..... 181
lizard on ants ..... 209
*Procambarus clarkii*, predation on *Corbicula* ..... 181

*Rangifer tarandus granti*, seasonal diet ..... 70
Reproduction, *Cnemidophorus* 93, 217
courtship on *Colias* ..... 334
nonrandom mating in housefly.. 200
pygmy spotted skunk ..... 390
seeds and seedlings of may apple ..... 51
Reptiles, food partitioning in *Graptemys* ..... 102
*Phrynosoma modestum* preys on ants ..... 209
Pleistocene wood turtle ..... 413
population and reproductive characteristics of *Cnemidophorus* ..... 217
reproduction by *Massasauga* .... 393
reproduction periodicity of *Cnemidophorus* ..... 93
systematics of *Cnemidophorus*.. 84
Rhode Island, migrations of Crustacea ..... 168
*Rhus copallina*, as bird food ..... 410

*Sistrurus catenatus catenatus*, reproduction ..... 393
South Carolina, genetic variation in crayfish ..... 225
Streams, trophic ecology of stoneflies ..... 341
unionid fauna ..... 233
Strip mine spoil bank, vegetation 19
Succession, on strip mine spoil .... 19
forest dynamics after fire ..... 321
Systematics, animal, *Cnemidophorus* ..... 84
genic variation in *Dipodomys* .. 77
hybridization in crayfish ..... 405

*Tadarida brasiliensis* mexicana, pesticide residues ..... 249
Tennessee, pleistocene wood turtle 413

Vegetation, effect of burning and mowing on prairie ..... 13
establishment on strip mine .... 19
forest structure of Pine Barrens 321
presettlement forests of Illinois 290
presettlement forests of New Jersey ..... 1
Vermont, wood-mouse nest in hornet's nest ..... 208
Virginia, tolerance of fish to physiochemical changes ..... 149

Washington, nutrition of serpentine endemic grass ..... 196
Wisconsin, food partitioning in *Graptemys* ..... 102
gray wolf ..... 408
Wyoming, colony characteristics of prairie dogs ..... 269

# The American Midland Naturalist

Founded by J. A. Nieuwland, C.S.C.


**Editor**
**Robert P. McIntosh**

Kraig Adler, Ithaca, New York.....Herpetology
Norman L. Christensen, Durham, North Carolina.....Plant Ecology
Gary L. Cunningham, Las Cruces, New Mexico.....Plant Physiology
Martin Daly, Hamilton, Ont., Canada.....Animal Behavior
Gerald W. Esch, Winston-Salem, North Carolina.....Parasitology
Frances C. James, Tallahassee, Florida.....Animal Ecology
Nancy Lorimer, St. Paul, Minnesota.....Genetics and Cytology
Rosemary J. Mackay, Toronto, Ont., Can...Limnology and Hydrobiology
Bertram G. Murray, Jr., New Brunswick, New Jersey.....Ornithology
R. L. Pardy, Lincoln, Nebraska.....Invertebrate Zoology
J. Mark Scriber, Madison, Wisconsin.....Entomology
Gerald E. Svendsen, Athens, Ohio.....Mammalogy
Dieter H. Wilken, Ft. Collins, Colorado.....Systematic Botany
James D. Williams, Washington, D.C.....Ichthyology



**Vol. 106, 1981**
**(July, October)**

**Dates of Publication**
**No. 1 August 18, 1981**
**No. 2 October 30, 1981**

PUBLISHED BY THE UNIVERSITY OF NOTRE DAME
NOTRE DAME, INDIANA

## CONTENTS

### No. 1, July, 1981


Food Habits and Bioenergetics of a Pair of Barn Owls and Owlets ..... Kirk L. Hamilton and Robert L. Neill 1

Morphologically Inferred Niche Differentiation in Stream Fishes ..... A. John Gatz, Jr. 10

Periphyton Production in an Appalachian Mountain Trout Stream ..... L. E. Hornick, J. R. Webster and E. F. Benfield 22

An Integrated Multivariate Analysis of Forest Communities of the Central Great Smoky Mountains ..... Michael S. Golden 37

Contrasting Vegetation Responses Following Two Forest Fires in Northeastern Minnesota ..... Lewis F. Ohmann and David F. Grigal 54

Productivity of Four Marsh Sites Surrounding Lake Pontchartrain, Louisiana ..... Glenn W. Cramer, John W. Day, Jr. and William H. Conner 65

Allelopathic Effects of Artemisia tridentata Leaves on Germination and Growth of Two Grass Species ..... Craig R. Groves and Jay E. Anderson 73

Population Dynamics and Seed Dispersal of Chaenorrhinum minus on Railroad Cinder Ballast ..... Robert M. Arnold 80

Effects of Age, Sex and Weight on Social Rank in Penned White-tailed Deer ..... Thomas W. Townsend and Edward D. Bailey 92

Seasonal Changes in Agonistic Behavior of Clethrionomys gapperi in Southeastern Manitoba and Its Possible Relation to Population Regulation ..... M. R. Perrin 102

Habitat Use by Northeastern Forest Rodents ..... W. L. Vickery 111

Habitat Differentiation Among Three Species of Sorex and Neurotrichus gibbsi in Washington ..... Carol J. Terry 119

Interrelationships Between Arceuthobium and Its Hosts ..... Robert O. Tinnin 126

Bionomics and Adult Behavior of a Lentic Caddisfly, Nectopsyche albida (Walker). William E. Tozer, Vincent H. Resh and John O. Solem. 133

Biogeography of the Colorado Herpetofauna ..... Sherman Lambert and William Harper Reid 145

Reproduction in a Nebraska Sandhills Population of the Northern Prairie Lizard Sceloporus undulatus garmani ..... Royce E. Ballinger, Dale L. Droge and Steven M. Jones 157

Movement Patterns and Home Range of the Gopher Tortoise ..... W. Alan McRae, J. Larry Landers and James A. Garner 165

Mortality and Area Reduction in Leaves of the Bog Shrub Chamaedaphne calyculata (Ericaceae) Caused by the Leaf Miner Coptodisca kalmiella (Lepidoptera: Heliozelidae) ..... Douglas R. Hileman and Lynda Fox Lieto 180


Notes and Discussion


Age Structure of Carya tomentosa (Poir.) Nutt. in a Young Oak Forest ..... Carl D. Monk 189

Morphological Features and Reproduction of Perognathus and Peromyscus on Northern Islands in the Gulf of California ..... Ayesha E. Gill 192

Reproductive Behavior and Biology of the Bluestripe Shiner (Notropis callitaenia) in Uchee Creek, Alabama ..... Richard K. Wallace, Jr. and John S. Ramsey 197

Least Shrew (Cryptotis parva) Mortality during Simulated Rainfall ..... R. J. Esher and J. L. Wolfe 201

Autotrophic Growth of Southern Root Parasites..... William F. Mann, Jr. and Lytton J. Musselman 203
Tolerance of Conspecifics by Short-Tailed Shrews (Blarina brevicauda) in Simulated Natural Conditions.. Irwin G. Martin 206

## CONTENTS
### No. 2, October, 1981

Ecological Consequences of Food Limitation for Adult Mantids (Tenodera ardifolia sinensis Saussure)..... R. M. Eisenberg, L. E. Hurd and J. A. Bartley 209
On the Stainability and Mortality of Periodical Cicada Eggs..... JoAnn White and Monte Lloyd 219
Species Composition and Life Histories of Aquatic Insects in a Lowland Sonoran Desert Stream..... Lawrence J. Gray 229
Reproductive Biology of Lampsilis radiata siliquoidea (Pelecypoda: Unionidae)..... Richard J. Trdan 243
Postflood Recolonization Pathways of Macroinvertebrates in a Lowland Sonoran Desert Stream..... Lawrence J. Gray and Stuart G. Fisher 249
Biogeography of Illinois Reptiles and Amphibians: A Numerical Analysis..... Jane H. Bock, Carl E. Bock and Randall J. Fritz 258
Differential Susceptibility of Sympatric Garter Snakes Species to Amphibian Skin Secretions..... J. Malcolm Macartney and Patrick T. Gregory 271
The Albany Pine Bush: A Northern Outpost for Southern Species of Amphibians and Reptiles in New York..... Margaret M. Stewart and John Rossi 282
Changes in Toad (Bufo americanus) Responses to Abiotic Factors at the Northern Limit of Their Distribution..... J. R. Bidre and K. A. Morrison 293
Relative Sensitivity of Reproductive Activity and Body-fat Level to Food Restriction in White-footed Mice..... M. H. Merson and R. L. Kirkpatrick 305
Succession in Granite Outcrop Shrub-tree Communities..... Donald L. Phillips 313
Time of Introduction of the Alien Component of the Spontaneous Illinois Vascular Flora..... R. D. Henry and A. R. Scott 318
Sex-linked Niche Differentiation in Two Species of Thalictrum..... Michael N. Melampy 325
Log Decomposition in Donaldson's Woods, Spring Mill State Park, Indiana..... Paul C. MacMillan 335
Magnesium Flux and Storage Relationships in Missouri Tallgrass Prairie..... John M. Callahan and C. L. Kucera 345
Feeding Behavior of a Plant: Differential Prey Capture in Old and New Leaves of the Pitcher Plant (Sarracenia purpurea).. Lorne M. Wolfe 352
Biology of the Blackside Dace Phoxinus cumberlandensis..... Lynn B. Starnes and Wayne C. Starnes 360
Ecology of Fundulus catenatus in Three Interconnected Stream Orders.. J. W. Fisher 372
Factor Analysis of Associations of Fishes in Little River, Central Texas, with an Interdrainage Comparison..... Dennis R. Rose and Anthony A. Echelle 379
Variation in the Songs of Vesper Sparrows Pooecetes gramineus..... Gary Ritchison 392

Notes and Discussion

Estimating Coyote Diet: A Validation . . . . . Mark K. Johnson 399
Evidence of Recent Breeding Activity in Wisconsin Wolves . . . . . Richard P. Thiel and Robert J. Welch 401
Rhopalosolen saccatus Fott: An Epizoophyte from an Alkaline Lake in Nebraska . . . . . Richard S. Holland and Gary L. Hergenrader 403
Plant Cultures for Observing Associated Protozoa and Other Rhizosphere Organisms . . . . . J. F. McClellan, R. V. Anderson, . . . . . W. D. Gould, A. J. Rubink and D. C. Coleman 406
Notes on the Microhabitats of Unionid Mussels in Some Michigan Streams . . . . . David L. Strayer 411
Statement of Ownership, Management and Circulation . . . . . 416

## Author Index

Anderson, Jay E. . . . . 73
Anderson, R. V. . . . . 406
Arnold, Robert M. . . . . 80

Bailey, Edward D. . . . . 92
Ballinger, Royce E. . . . . 157
Bartley, J. A. . . . . 209
Benfield, E. F. . . . . 22
Bider, J. R. . . . . 293
Bock, Carl E. . . . . 258
Bock, Jane H. . . . . 258

Callahan, John M. . . . . 345
Coleman, D. C. . . . . 406
Conner, William H. . . . . 65
Cramer, Glenn W. . . . . 65

Day, John W., Jr. . . . . 65
Droge, Dale L. . . . . 157

Echelle, Anthony A. . . . . 379
Eisenberg, R. M. . . . . 209
Esher, R. J. . . . . 201

Fisher, J. W. . . . . 372
Fisher, Stuart G. . . . . 249
Fritz, Randall J. . . . . 258

Garner, James A. . . . . 165
Gatz, A. John, Jr. . . . . 10
Gill, Ayesha E. . . . . 192
Golden, Michael S. . . . . 37
Gould, W. D. . . . . 406
Gray, Lawrence J. . . . . 229, 249
Gregory, Patrick T. . . . . 271
Grigal, David F. . . . . 54
Groves, Craig R. . . . . 73

Hamilton, Kirk L. . . . . 1
Henry, R. D. . . . . 318
Hergenrader, Gary L. . . . . 403
Hileman, Douglas R. . . . . 180
Holland, Richard S. . . . . 403
Hornick, L. E. . . . . 22
Hurd, L. E. . . . . 209

Johnson, Mark K. . . . . 399
Jones, Steven M. . . . . 157

Kirkpatrick, R. L. . . . . 305
Kucera, C. L. . . . . 345

Lambert, Sherman . . . . . 145
Landers, Larry . . . . . 165
Lieto, Lynda Fox . . . . . 180
Lloyd, Monte . . . . . 219

Macartney, J. Malcolm . . . . . 271
MacMillan, Paul C. . . . . 335
Mann, William F., Jr. . . . . 203
Martin, Irwin G. . . . . 206
McClellan, J. F. . . . . 406
McRae, W. Allan . . . . . 165
Melampy, Michael N. . . . . 325
Merson, M. H. . . . . 305
Monk, Carl D. . . . . 189
Morrison, K. A. . . . . 293
Musselman, Lytton J. . . . . 203

Neill, Robert L. . . . . 1

Ohmann, Lewis F. . . . . 54

Perrin, M. R. . . . . 102
Phillips, Donald L. . . . . 313

Ramsey, John S. . . . . 197
Reid, William Harper . . . . . 145
Resh, Vincent H. . . . . 133
Ritchison, Gary . . . . . 392
Rose, Dennis R. . . . . 379
Rossi, John . . . . . 282

Rubink, A. J. ..... 406
Scott, A. R. ..... 318
Solem, John O. ..... 133
Starnes, Lynn B. ..... 360
Starnes, Wayne C. ..... 360
Stewart, Margaret M. ..... 282
Strayer, David L. ..... 411
Terry, Carol J. ..... 119
Thiel, Richard P. ..... 401
Tinnin, Robert O. ..... 126
Townsend, Thomas W. ..... 92
Tozer, William E. ..... 133
Trdan, Richard J. ..... 243
Vickery, W. L. ..... 111
Wallace, Richard K., Jr. ..... 197
Webster, J. R. ..... 22
Welch, Robert J. ..... 401
White, JoAnn ..... 219
Wolfe, J. L. ..... 201
Wolfe, Lorne M. ..... 352

## Subject Index

Activity, toad responses to abiotic factors ..... 293
Alabama, behavior of bluestripe shiner ..... 197
Algae, Periphyton production ... 22
*Rhopalosolen saccatus* ..... 403
Allelopathy, effects of *Artemisia tridentata* ..... 73
Amphibians, biogeography of Illinois ..... 258
effects of skin secretions on garter snakes ..... 271
northern outpost for southern species ..... 282
toad response to abiotic factors 293
*Arceuthobium* spp., interrelationship with host ..... 127
Arizona, aquatic insects in desert streams .....229, 249
*Artemisia tridentata,* allelopathic effects of ..... 73
Baja California, rodents ..... 192
Behavior, agonistic of redbacked vole ..... 102
caddisfly ..... 133
feeding of pitcher plant ..... 352
home range of gopher tortoise ..... 165
reproductive of bluestripe shiner ..... 197
social rank of white-tailed deer 92
tolerance of shrews for conspecifics ..... 206
variation in songs of vesper sparrow ..... 392
Biogeography, alien flora of Illinois ..... 318
Colorado herpetofauna ..... 145
Illinois reptiles and amphibians ..... 258
New York northern outpost for southern species ..... 282
Birds, barn owls, food and energetics ..... 1
songs of vesper sparrows ..... 392
*Blarina brevicauda,* tolerance of conspecifics ..... 206
British Columbia, susceptibility of garter snake to amphibian secretions ..... 271
*Bufo americanus,* responses to abiotic factors ..... 293
*Canis latrans,* diet ..... 399
*Canis lupus lycaon* breeding .... 401
*Carya tomentosa,* age structure .... 189
*Chaenorrhinum minus,* population dynamics ..... 80
*Chamaedaphne calyculata,* leaf mining on ..... 180
*Clethrionomys gapperi,* agonistic behavior ..... 102
Colorado, biogeography of herpetofauna ..... 145
*Coptodisca kalmiella,* leaf miner on leatherleaf ..... 180
*Cryptotis parva,* mortality ..... 201
Decomposition, of logs ..... 335
Delaware, food limitation in mantids ..... 209
Desert, aquatic insects in stream .....229, 249
Ecology, animal, aquatic insects in desert stream .....229, 249
associations of fishes ..... 379
food limitation in mantids .... 209
habitat differentiation in rodents ..... 119
habitat use by rodents ..... 111

home range of gopher tortoise ..... 164
morphology and reproduction of rodents ..... 192
northern studfish ..... 372
rain, effect on shrew mortality ..... 201
reproduction of northern prairie lizard ..... 157
toad responses to abiotic factors ..... 293
Ecology, plant, age structure of mockernut hickory ..... 189
herbivory on leatherleaf ..... 180
log decomposition ..... 335
magnesium flux in prairie .... 352
niche differentiation in *Thalictrum* ..... 325
succession on granite outcrops ..... 313
Energetics, barn owl ..... 1

Fire, forest response to ..... 56
Fish, associations ..... 379
biology of blackside dace ..... 360
ecology of northern studfish ... 372
niche differentiation ..... 10
reproductive behavior of blue-stripe shiner ..... 197
Flora, alien species in Illinois .... 318
Food, barn owls ..... 1
coyote diet ..... 399
ecological consequences of limitation in mantids .... 209
Forest, communities of the Great Smoky Mts. ..... 37
fire ..... 54
log decomposition ..... 335
*Fundulus catenatus,* ecology ..... 372

Georgia, succession on granite outcrop ..... 313
*Gopherus polyphenus,* home range ..... 165
Great Smoky Mountains, forest ..... 37

Habitat, differentiation in *Sorex* ..... 119
use by rodents ..... 111
Herbivory, leaf miner on leather-leaf ..... 180
Home range, of gopher tortoise ..... 165

Indiana, bionomics and behavior of caddisfly ..... 133
log decomposition ..... 335
Illinois, alien flora ..... 318
biogeography of reptiles and amphibians ..... 258
Insects, aquatic in desert ....229, 249
caddisfly behavior ..... 133
eggs of *Magicicada* ..... 219
food limitation in mantids .... 209
leaf miner on leather leaf ..... 180
Invertebrates (other than insects), composition of desert streams . 229
mussels in streams ..... 411
recolonization of desert stream 249
reproduction of *Lampsilis* ..... 243

Kentucky, biology of blackside dace ..... 360
ecology of northern studfish . 372

Lakes, alkaline ..... 403
*Lampsilis radiata siliquoides,* reproduction ..... 243
Louisiana, marsh productivity .. 65

*Magicicada* sp., egg mortality .... 219
Magnesium, flux and storage in prairie ..... 345
Mammals, agonistic behavior of red-backed vole ..... 102
food of coyote ..... 399
habitat use by rodents ..... 111
morphology and reproduction of rodents ..... 192
mortality of least shrew ..... 201
social rank of white-tailed deer 92
tolerance of shrews for conspecifics ..... 206
tolerance of conspecifics by short-tailed shrew ..... 206
wolves breeding ..... 401
Manitoba, agonistic behavior, of red-backed vole ..... 102
Marsh, productivity ..... 65
Michigan, mussels in streams ... 411
Microhabitat, mussel ..... 411
Minnesota, reproduction of *Lampsilis* ..... 243
variation in songs of vesper sparrow ..... 392
vegetation response to fire .... 56
Missouri, magnesium flux in prairie ..... 345
Multivariate analysis, forests .... 37

Nebraska, *Rhopalosolen saccatus* ... 403
reproduction of northern prairie lizard ..... 157

*Nectopsyche albida,* bionomics and behavior ..... 133
*Neurotrichus gibbsi,* habitat differentiation ..... 119
New York, northern outpost for reptiles and amphibians . 282
population dynamics of *Chaenorrhinum minus* ..... 80
Niche, differentiation in fish .... 10
differentiation in *Thalictrum* ... 325
North Carolina, niche differentiation in stream fishes ..... 10
*Notropis callitaenia,* reproductive behavior ..... 197

*Odocoileus virginianus borealis,* social rank ..... 92

Parasites, *Arceuthobium* and its hosts ..... 126
autotrophic growth of ..... 203
Periphyton, production ..... 22
*Peromyscus leucopus,* reproductive activity ..... 305
*Phoxinus cumberlandensis,* biology of ..... 360
Physiology, animal, sensitivity of reproduction to food restriction ..... 305
*Pooecetes gramineus,* variation in songs ..... 392
Population, age structure of mockernut hickory ..... 189
dynamics of *Chaenorrhinum minus* ..... 80
mortality of least shrew ..... 201
mortality of leatherleaf ..... 180
regulation of red-backed vole .. 102
Prairie, lizard reproduction ..... 157
magnesium flux ..... 345
Production, marsh ..... 65
stream periphyton ..... 22
Protozoa, culture technique ..... 406

Quebec, habitat use by rodents .. 111
toad responses to abiotic factors ..... 293

Rain, effect on least shrew mortality ..... 201
Reproduction, behavior of bluestripe shiner ..... 192
eggs of *Magicicada* ..... 219
northern prairie lizard ..... 157
*Lampsilis* ..... 243
rodent ..... 192
sensitivity to food restriction in white-footed mouse ..... 305
wolves breeding ..... 401
Reptiles, biogeography of Colorado herpetofauna .... 145
biogeography of Illinois ..... 258
garter snake susceptibility to amphibian secretion ..... 271
home range of gopher tortoise ..... 165
northern outpost for southern species ..... 282
reproduction of northern prairie lizard ..... 157
*Rhopalosolen saccatus* in alkaline lake ..... 403

*Sarracenia purpurea,* feeding behavior ..... 352
*Sceloporus undulatus garmani,* reproduction ..... 157
Seed, dispersal of *Chaenorrhinum minus* ..... 80
*Sorex* spp., habitat differentiation ..... 117
Streams, aquatic insects in desert 229
association of fishes ..... 379
caddisfly behavior ..... 132
ecology of *Fundulus* ..... 372
macroinvertebrates in desert .. 249
mussel microhabitat ..... 411
niche differentiation in fish ... 10
periphyton production ..... 22
Successsion, on granite outcrop .. 313
*Tenodera ardifolia sinensis* food limitation ..... 209
Texas, associations of fishes ..... 379
barn owls ..... 1
*Thalictrum* spp., niche differentiation ..... 325
Toxins, garter snake sensitivity to ..... 271
*Tyto alba,* food habits and energetics ..... 1

Vegetation, forest community analysis ..... 37
productivity of marsh ..... 65
response to fire ..... 54
succession of shrub-tree communities ..... 313
Virginia, stream periphyton .... 22

Washington, habitat differentiation of rodents ..... 119
Wisconsin, wolves breeding ..... 401